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Derivation of induced pluripotent stem cells from an infertile boar carrying a reciprocal translocation

New insights in pig pluripotency by two approaches of cell reprogramming

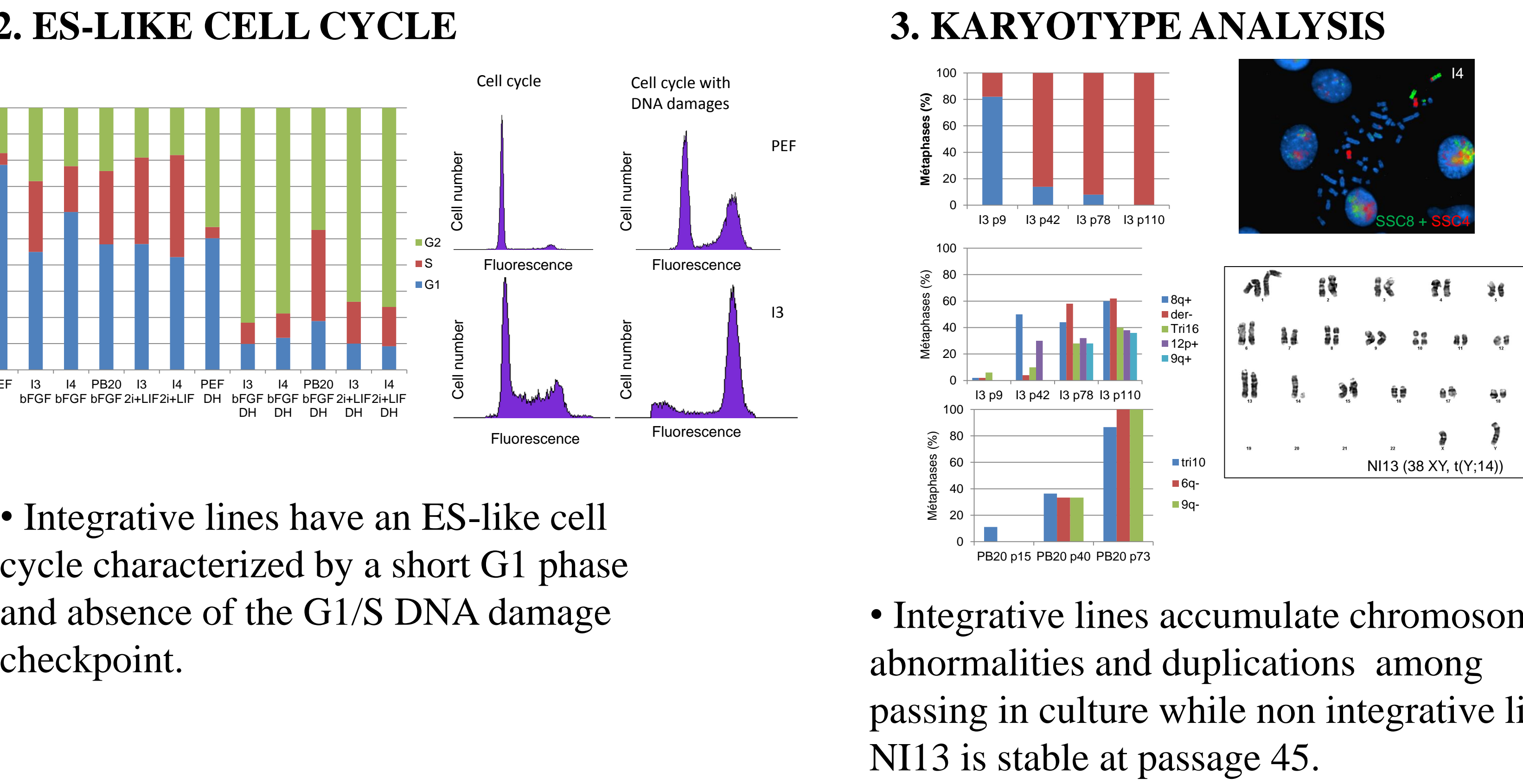
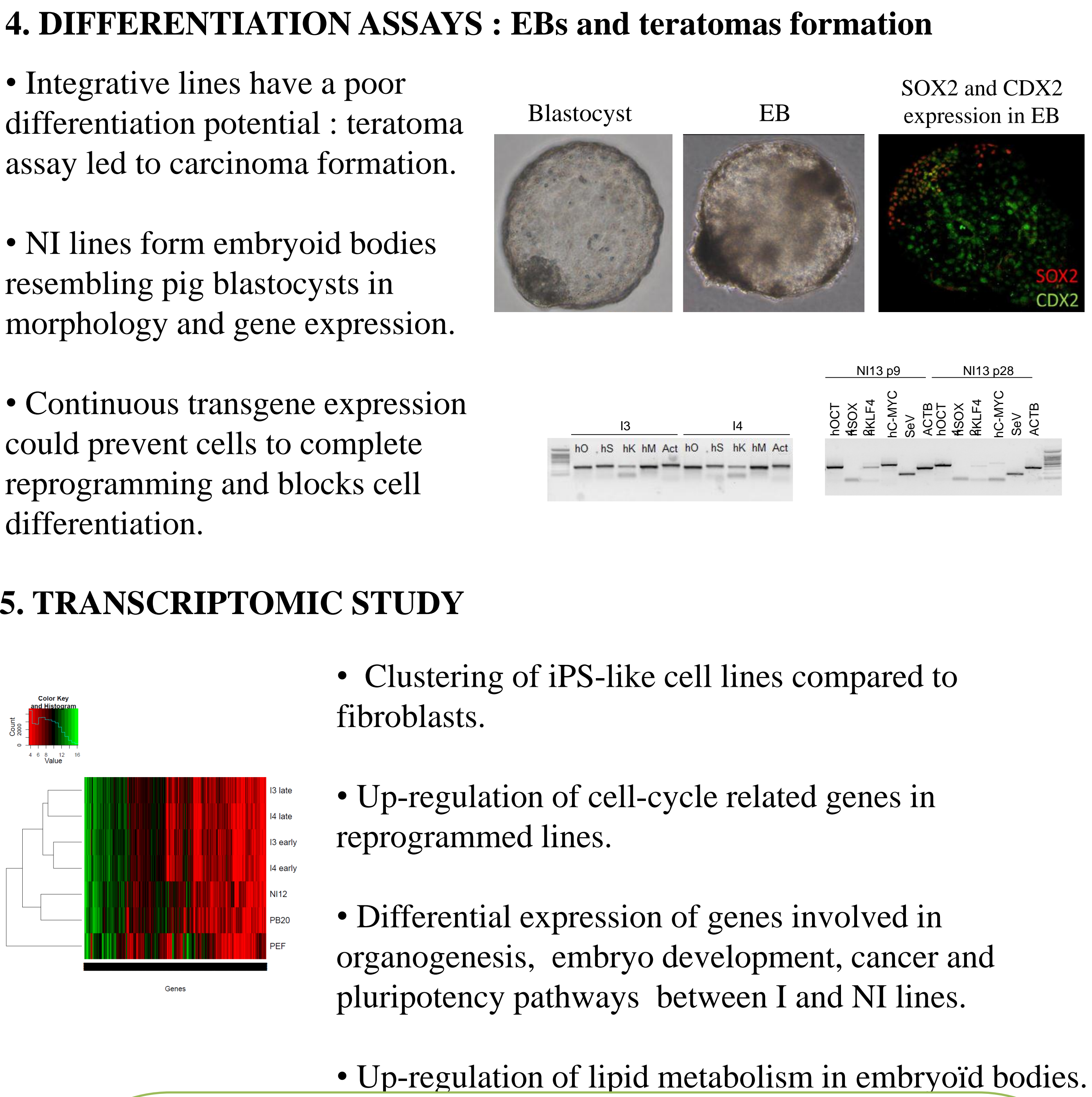
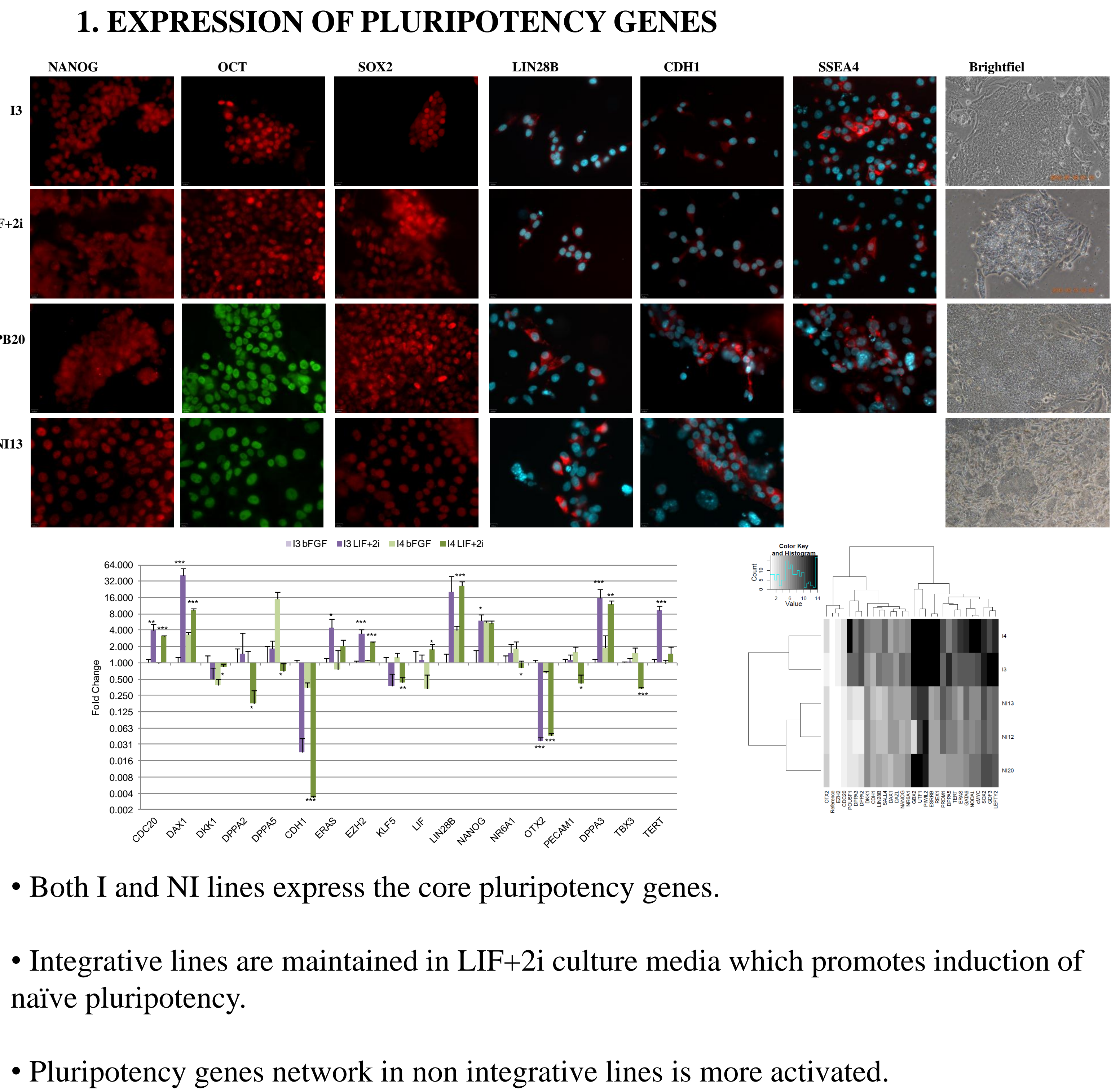
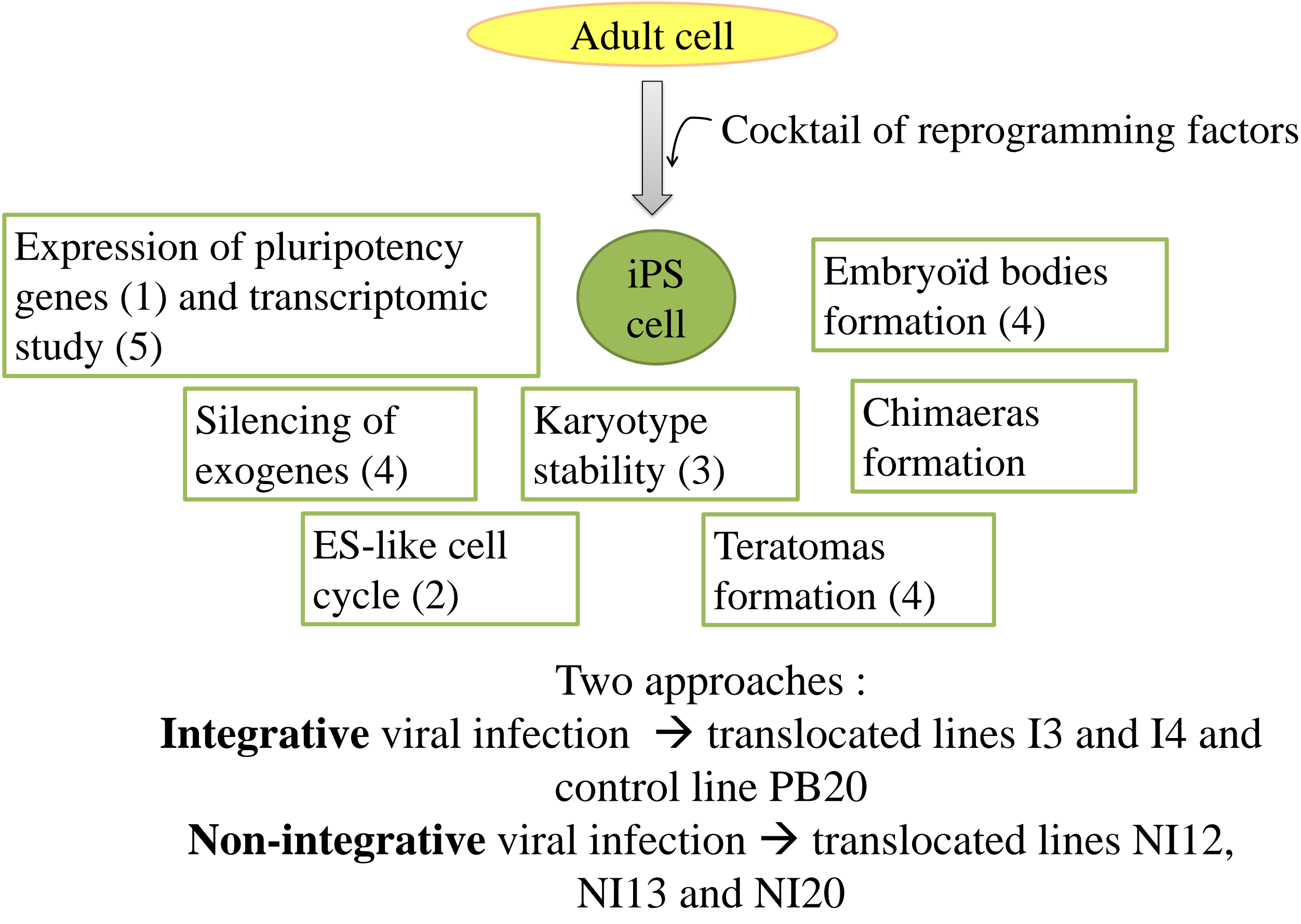
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INTRODUCTION

Derivation of germ cells from embryonic (ES) or induced (iPS) pluripotent stem cells in mouse and human is a great advance for the study of germ cell biology in the earlier step of development and provide an *in vitro* model for the analysis of new mechanisms leading to infertility.

Based on recent advances in pig iPS production, we propose here to **create a library of porcine iPS derived from fibroblasts of infertile boars carrying chromosomal rearrangements**. Using two systems of cell reprogramming, we produced and characterized iPS-like cell lines from fibroblasts with a t(Y;14) reciprocal translocation. Gene expression analysis, differentiation assays and cytogenetic analysis were used to assess the reprogramming efficiency of both protocols and the pluripotency level of the cell lines. This study gives new insights on pig pluripotency of which mechanisms have not been completely solved yet.



CONCLUSION AN PROSPECTS

We used two different reprogramming systems (I and NI) to produce iPS-like cells from t(Y;14) fibroblasts coming from an infertile boar. These cells lines share key pluripotency features with mouse and human iPS cells, like the **expression of core pluripotency genes** and the **specificity of their cell cycle**. Depending on the culture conditions, I cell lines express genes of both **primed and naïve pluripotency**. Those cells have a **poor differentiation** potential and accumulate easily **chromosomal abnormalities**.

NI lines on the contrary are **karyotypically stable** over time, show a slow **repression of exogenous reprogramming factors**, seems to deeper **activate the pluripotency network** even in primed culture conditions and form **blastocyst-like embryoid bodies**.

Further studies are needed to break down the barriers blocking the complete reprogramming of pig somatic cells and access to ground pluripotency : epigenetic barrier, loss of transgene expression, role of different signaling pathways (lipid metabolism) in pluripotency and requirement to extrinsic factors for cell differentiation.